

DIRECT TESTIMONY OF

ANDREW M. DURKEE

ON BEHALF OF

DOMINION ENERGY SOUTH CAROLINA, INC.

DOCKET NO. 2023-9-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION.

A. My name is Drew Durkee. My business address is 1902 Reston Metro Plaza, Reston, VA 20190. I am employed by ICF Resources, LLC (“ICF”) as a Director.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Dominion Energy South Carolina, Inc. (“DESC” or the “Company”).

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE.

A. I am a 2004 graduate of James Madison University with a Bachelor of Science Degree in Integrated Science and Technology with a concentration in Energy and a 2009 graduate of the University of Texas at Austin with a Master of Arts Degree in Energy and Earth Resources with a concentration in Demand Side Management (“DSM”). I have over 15 years of experience in the planning, implementation, and evaluation of utility DSM programs. I have been employed by ICF for approximately 15 years, and

1 currently serve as a Director in the Flexible Load Management and Energy
2 Markets Analytics Practice. Prior to returning to ICF in 2010, I was
3 employed by: Frontier Associates as an Energy Analyst in the DSM program
4 evaluation practice. I have led the development of over 100 individual DSM
5 programs, including: program design, establishment of incentives,
6 forecasting of participation, cost-effectiveness testing, creation of marketing
7 strategies, and estimation of implementation costs. I have contributed to the
8 development of these programs, including potential study analysis for utility
9 clients in Arkansas, California, Colorado, Delaware, Georgia, Illinois,
10 Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi,
11 Missouri, New Jersey, New York, North Carolina, Oregon, Oklahoma,
12 Pennsylvania, South Carolina, Texas, Virginia, Washington, Wisconsin, and
13 the District of Columbia.

14 **Q. PLEASE DESCRIBE ICF.**

15 A. Founded in 1969, ICF is a consulting and professional services firm
16 supporting the energy, environmental, health, technology, and aviation
17 sectors. Publicly traded (NASDAQ: ICFI) with over 9,000 employees and
18 \$1.75 billion in annual revenue, ICF currently implements more than 200
19 DSM and electrification programs for over 60 utilities in 26 states. ICF has
20 also been the lead contractor for the Environmental Protection Agency's
21 ("EPA") ENERGY STAR® program since its inception and also supports
22 the U.S. Department of Energy's Better Buildings and Commercial Building

1 Alliance programs.

2 **Q. HAVE YOU EVER TESTIFIED BEFORE THIS COMMISSION?**

3 A. No.

4 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

5 A. My testimony provides an overview of ICF's analysis of potential
6 DSM programs on behalf of DESC as reported in the 2023 DSM Potential
7 Study which is attached to my testimony as Exhibit ____ (AMD-1).

8 Specifically, my testimony explains the process by which ICF
9 conducted the 2023 DSM Potential Study ("Potential Study") and concludes
10 that the analysis performed, and scenarios presented, are both reasonable and
11 accurate.

12 **Q. ARE THERE ANY CHANGES OR CORRECTIONS TO THE 2023**
13 **DSM POTENTIAL STUDY?**

14 A. Yes. Table 5 of page 18 contains totals that are incorrect. The correct
15 totals are listed in my testimony at Table 2, below. The other data contained
16 in the table is correct and there are no changes to the analysis or conclusions
17 based on these totals. In addition, on page 29, the first sentence references
18 residential portfolio and should reference the C&I portfolio. These changes
19 are included in Exhibit ____ (AMD-1).

Q. WHAT WERE THE PRIMARY OBJECTIVES OF THE POTENTIAL STUDY?

A. The primary objectives of the 2023 DSM Potential Study were to:

- 1) Evaluate technical, economic, achievable, and maximum achievable potential for DSM programs in DESC's service territory looking at a broad range of possible programs and measures;
- 2) Calculate the reductions in sales that could be achieved by DSM programs achieving technical, economic, achievable, and maximum achievable potentials and the associated costs of those programs;
- 3) Identify and quantify the opportunities for expanded demand response ("DR") programs to reduce winter peak demand on DESC's system as a part of DESC's DSM programs;
- 4) Determine whether DSM programs achieving a 1%, 1.25%, 1.5%, 1.75% or 2.0% reduction in load growth were achievable and cost effective in DESC's service territory, as required by the South Carolina Public Service Commission (the "Commission") in Order No. 2020-832;
- 5) Provide the inputs regarding DSM program results and costs necessary for DESC to complete its 2023 Integrated Resource Plan ("IRP"); and

1 6) Meet all requirements of the Commission orders and directives
2 in fulfilling these goals.

3 In addition to these primary objectives, ICF undertook this process
4 under guiding principles of transparency and inclusiveness.

5 **Q. WHAT ARE THE DEFINITIONS OF TECHNICAL, ECONOMIC,**
6 **AND ACHIEVEABLE POTENTIAL?**

7 A. In order to ensure all stakeholders were operating from a similar
8 sphere of understanding, definitions of these were discussed with the
9 stakeholder group with many of the definitions coming directly from
10 stakeholders and accepted by both DESC and ICF. All of the definitions are
11 based on standard EPA defined terms¹ and were agreed upon at the April 28,
12 2022, Energy Efficiency Advisory Group (“EEAG” or “Advisory Group”)
13 meeting. The final definitions, as agreed to with the Advisory Group, are:

- 14 • Technical Potential: “the theoretical maximum amount of energy use
15 that could be displaced by efficiency, disregarding all non-
16 engineering constraints such as cost effectiveness and the willingness
17 of end users to adopt the energy efficiency measures.”

¹ US EPA - Neubauer, Max: *Cracking the TEAPOT: Technical, Economic, and Achievable Energy Efficiency Potential Studies*. American Council for an Energy Efficient Economy, Report U1407, August 2014, p.6.

- 1 • Economic Potential: “the subset of technical potential that is
2 economically cost-effective as compared to conventional supply-side
3 energy resources.”
- 4 • Achievable Potential: ICF uses the EPA definition, “a subset of
5 economic potential, is the energy savings that could be realistically
6 achieved given real-world constraints, including market and
7 programmatic barriers.” Stakeholders requested that ICF evaluate
8 several achievable scenarios based on varying levels of investment
9 and program enhancement which ICF has done.
- 10 • Maximum Achievable Potential as defined by the EPA: “the amount
11 of energy use that [energy] efficiency can realistically be expected to
12 displace assuming the most aggressive program scenario possible.”

13 **Q. WHY ARE THE TECHNICAL AND ECONOMIC POTENTIALS**
14 **INCLUDED HERE?**

15 A. The technical and economic potentials are included based on the
16 requirements of Order No. 2019-880 which in turn were based on the
17 suggestions of intervenors in that proceeding.

18 **Q. WHAT DO THE TECHNICAL AND ECONOMIC POTENTIALS**
19 **SIGNIFY?**

20 A. Calculating the technical and economic potentials are screening steps
21 in the process for determining achievable DSM levels. They do not account
22 for any limitations on customer willingness to participate in programs or the

1 costs or practical limitations in delivering programs. They show conceptually
2 the maximum number of potential measures that exist for a given service
3 territory (technical potential) and the maximum number of those measures
4 that would be economic assuming full customer participation and no cost of
5 incentives or non-incentive program costs (economic potential). They are
6 not intended to represent results that can be accomplished in the real world.

7 **Q. WHAT ARE THE COMMISSION REQUIRED SCENARIOS?**

8 A. In Order No. 2020-832 the Commission required DESC to evaluate
9 the achievability and cost-effectiveness of four higher levels of capacity and
10 energy savings from DSM: 1.25%, 1.5%, 1.75%, and 2%. As discussed
11 below, ICF evaluated the levels of customer penetration needed to achieve
12 these levels of energy savings and determined that they are not achievable in
13 DESC's service territory through a utility DSM program.

14 **Q. DOES THE 2023 DSM POTENTIAL STUDY MEET THE**
15 **REQUIREMENTS OF THE COMMISSION ORDERS AND**
16 **DIRECTIVES?**

17 A. Yes. The Commission orders and directives governing this 2023
18 Potential Study spanned multiple proceedings and dockets. One challenge in
19 conducting this study was accommodating all of the directives which added
20 a great deal of complexity to the process.

1 **Q. WHAT PROCESS WAS USED TO MEET THE OBJECTIVES OF**
 2 **THE POTENTIAL STUDY?**

3 A. The primary steps in determining the technical, economic and
 4 achievable DSM potential for DESC's service territory included:

- 5 1. **Identification and characterization of the measures** or permutations of
 6 measures to be included in the analysis. A measure is a single instance
 7 of a particular energy-efficient technology or activity, such as a single
 8 type of efficient lighting, a home energy report, or installation of a low-
 9 flow showerhead. In consultation with stakeholders, ICF identified 218
 10 measures, and 1,997 permutations of measures to evaluate in preparing
 11 this report. This stage of the process also involved the development of
 12 the measure cost for each measure and its potential impact on customers'
 13 loads and load shapes.
- 14 2. **Cost-effectiveness model development** includes development of
 15 planning assumptions as to the value of the saved energy and demand,
 16 discount rates and other inputs necessary to calculate cost effectiveness
 17 of measures.
- 18 3. **Eligible stock calculation** determines the universe of potential
 19 opportunities in DESC's service territory to deploy the measures being
 20 evaluated. For example, if the measure is an HVAC upgrade, the eligible
 21 stock calculation determines how many HVAC units are on DESC's
 22 system that potentially can be upgraded. This task includes data collection
 23 on customer types in DESC's service area, the number and types of
 24 buildings, the types of energy-using equipment that are in each building
 25 type, and the current saturation of energy-efficient equipment. These first
 26 three steps in the analysis provided the information needed to determine
 27 the Technical Potential, *i.e.*, the maximum savings possible assuming no
 28 requirement of cost effectiveness or unlimited customer participation or
 29 other limitations on program effectiveness. Table 4 in the 2023 DSM
 30 Potential Study gives an example of how eligible stock is calculated.
- 31 4. **Measure cost-effectiveness screening** identifies the incremental cost of
 32 the efficient measure and compares it to the value of the energy savings
 33 the efficient measure produces. The incremental cost of the measure is
 34 the difference in cost between the efficient measure and its inefficient
 35 alternative. For example, if the efficient measure is a high-efficiency
 36 HVAC unit, the incremental cost of the measure is the difference between
 37 the higher cost of that unit and the lower efficiency HVAC unit customers
 38 could otherwise choose. Measure cost-effectiveness screening excludes

necessarily uneconomical measures but does not indicate that a measure can be delivered on a cost effective or efficient basis. At this point in the analysis, measures have not been bundled into programs and program costs, incentive costs, customer acceptance rates and other costs of promoting a measure have not been identified. Measure cost-effectiveness screening indicates only that the potential savings from the measure is greater than the incremental cost of the measure standing alone. To determine measure cost-effectiveness, ICF screened the incremental cost and energy savings of each individual measure under the Total Resource Cost (TRC) benefit cost test which is the test used by two-thirds of the states which use an individual test to establish the cost-effectiveness of their programs. Where applicable, non-energy benefits were included in the TRC calculations, including natural gas savings, and avoided and deferred equipment replacement costs. Measures with a TRC test result above 1.0 produce benefits that are greater than their costs and form the basis of the Economic Potential for DSM programs within DESC's service territory. These measures, and permutations of these measures, were passed to the next step of the analysis to determine the actual benefits that could be achieved by implementing them.

5. **Achievable Potential Analysis**, which included estimation of the achievable potential for programs containing all passing measures. This includes developing cost and savings forecasts for programs as implemented along with reasonable estimates of customer acceptance rates. It is at this stage that the cost effectiveness of programs as delivered in DESC's system is assessed and incentive and non-incentive costs are included in the calculation for the first time, along with reasonable assumptions concerning customer participation.
6. **Cost-effectiveness and impact reporting**, including annual program participation, impact, cost, and savings estimates along with program and portfolio cost-effectiveness results.

Each of these steps are discussed in detail in Exhibit No. ____ (AMD-1).

In order to not have the potential be hampered by primarily using DESC's historic results from "pandemic years," pre-COVID years were used to inform that potential analysis and the regional utility program benchmarking used to supplement specific market data and results where needed.

Q. WERE THERE OPPORTUNITIES FOR STAKEHOLDER FEEDBACK DURING THIS PROCESS?

A. Yes. During the Potential Study, there were several opportunities for stakeholder input. At the beginning of the Potential Study, the methodology and list of measures to be evaluated were presented to the Advisory Group. In addition, there were multiple workgroups conducted in order to ensure stakeholder feedback was included in the analysis. Near the end of the Potential Study, draft results were presented to the Advisory Group and feedback was incorporated into the final analysis and report. A full list of workgroups and opportunities for feedback is found in Table 1 below with the ones that included open discussion meetings in bold.

Table 1. DSM Energy Efficiency Advisory Group Sessions

Date	Purpose
April 2021	ICF Potential Study Scope of Work Input Meeting with Stakeholders
July 2021	Review of Draft Opinion Dynamics Market Assessment Scope of Work
August 2021	Opinion Dynamics Market Assessment Begins
November 2021	Market Study Update and ICF Decision for Potential Study
February 2022	Market Study Update and ICF Modeling and Forecasting Scope, Scenario Definitions
April 2022	ODC Market Residential Characterization Study Update, Potential Study Update and Feedback on EE and DR Measures Requested
June 23, 2022	ODC Commercial Market Characterization Study Update, EE Profile Development Meeting, and Measure List Discussion with Stakeholders

June 29, 2022	Special Meeting to Address PSC Order to Address Stakeholder Recommendations
August 25, 2022	Potential Study Economic/Technical Potential Results Shared, ODC PY11 EM&V Results and Program Specific Recommendations
September 7, 2022	Measure Characterization Workbooks Sent for Stakeholder Feedback
October 13, 2022	End Use Profiles Details Shared
October 20, 2022	Meeting to Address Measure Characterization Questions and Potential Study Update and Results Shared
November 16, 2022	Draft of Potential Study Final Results Shared
November 18, 2022	Walk-through of Draft Potential Study Final Results
December 29, 2022	Response to Stakeholder Potential Study results and Higher Case EE Scenarios (1-2%) Shared with Stakeholders

Q. HOW DOES THIS POTENTIAL STUDY DIFFER FROM DESC'S LAST POTENTIAL STUDY IN 2019?

A. This process builds upon DESC's 2019 potential study in many ways. Some of the most significant include:

1. It continues to leverage DESC's experience implementing programs and refining programs since they were introduced in 2010, and since the last program design. As such, it better reflects the attributes of the DESC customer base, as well as the needs and capabilities of the trade ally community.
2. It includes extensive new service territory specific data. As a part of this Potential Study, a new market study was conducted by ODC, giving DESC detailed insight into its customers' current uses of energy and opportunities to increase efficiency.
3. It reflects the fact that a significant number of DESC's largest customers have elected to opt-out of the DSM programs, significantly reducing

DESC's ability to pursue energy savings with the industrial customer base.

4. It reflects the increasing natural adoption of certain energy efficiency measures.
5. It updates the assumed costs of measures, reflecting the fact that the costs of some measures have changed significantly since the previous study.
6. It reflects DESC's updated avoided capacity and energy costs.
7. It assesses the winter capacity savings of energy efficiency measures in order to assess the benefits when they are maximized on DESC transmission and delivery service. The prior study assessed summer capacity savings.
8. It reflects the continued decline of savings opportunities associated with screw-based lighting (LEDs).
9. It reflects expanded utility benchmarking as discussed in section 2.4.4.1 of the 2023 DSM Potential Study as urged by the Advisory Group
10. It uses end use specific avoided energy costs. One of the criticisms from stakeholders about previous potential study was that the avoided energy cost used was the same across end uses. For this analysis different avoided energy costs were developed for six residential end uses and six non-residential end uses, including Whole Home and Whole Building.

Q. PLEASE DESCRIBE HOW THE LOAD REDUCTIONS ASSOCIATED WITH THE ENERGY EFFICIENCY ("EE") MEASURES WERE VALUED.

A. Each kilowatt ("kW") saved by a measure was valued based on DESC's avoided cost of capacity in the winter. Each kilowatt hour ("kWh") saved was valued based on DESC's avoided cost of energy. As Mr. Neely can explain, DESC derives a change case by adding a 100 MW purchase to a standard resource plan then adjusts the expansion plan accordingly. The difference in the revenue requirement between the base case and the change case defines the avoided capacity cost. For EE, that value is multiplied by

63.7% which is the percentage of EE available at winter peak. For the purposes of this calculation, a value of \$72.84 per kW (in 2022 dollars), which is inclusive of transmission and distribution, was used along with the application of a 15.06% peak line-loss factor and a 14% reserve margin factor. The avoided energy cost is the difference between the base case costs and the change case costs. For the purposes of this calculation, end use specific values were developed for twelve end uses and can be found in Appendix H of the 2023 DSM Potential Study in Exhibit ____ (AMD-1). The use of end-use specific avoided energy costs was at the request of stakeholders and ICF undertook considerable effort in order to modify the models being used to accommodate this request. These avoided energy costs were followed by the application of an 9.25% average line-loss factor. The Company's witness Mr. Neely can testify further to this calculation.

Q. PLEASE SUMMARIZE THE RESULTS OF THE MEASURE SCREENING.

A. In total, ICF analyzed 218 measure types and 1,997 measure permutations (an application of a measure in a specific building type) for this Potential Study. Descriptions of each measure type and permutation appear in Appendix A of Exhibit No. ____ (AMD-1) along with each measure's cost-effectiveness results. Table 2 shows the number of measures evaluated for cost-effectiveness and the number that have TRC benefit cost ratios above

1.0. About 70% of the measures evaluated were found to be cost-effective and were therefore included in the energy efficiency programs.²

Table 2. Number of Measures Tested for Cost-Effectiveness and Included in the Analysis

Sector	Measure Types Tested for Cost-Effectiveness	Measure Permutations Tested for Cost-Effectiveness	Measure Types Passing Cost-Effectiveness Screening (Included in Analysis)	Measure Permutations Passing Cost-Effectiveness Screening (Included in Analysis)
Residential	116	350	90	270
C&I	102	1,647	81	1,257
TOTAL	218	1,997	171	1,527

Q. HOW WERE THE PASSING MEASURES BUNDLED FOR THE VARYING POTENTIAL STUDY SCENARIOS ULTIMATELY PRESENTED?

A. For the Technical and Economic potential scenarios, the measures were aggregated at the end use level for assessment purposes. Because Technical and Economic are only assessments of what could theoretically be achieved without any limits of customer adoption, reviewing these results at the end use allow for the greatest understanding of where the savings are

² In most cases, only measures with a TRC of 1.0 or higher were included in a program. An exception to this rule for non-cost-effective measure permutations was made when most of the permutations of that measure type were cost-effective. For example, if a measure type was cost-effective for a majority of, but not all, applicable building types, the measure type was included for all building types since excluding participation by customers in a specific building type can be impractical in implementation. Also, if a measure was cost-effective for a minority of building types, ICF excluded all permutations of the measure in the potential analysis since it can be impractical in implementation to limit participation to certain building types. In certain cases, non-cost-effective measures were included in a program if it was believed that the measure should remain for reasons such as reducing the entry barrier for other measures or meeting the needs of hard-to-reach customers.

coming from. The Achievable scenarios (including Low, Medium, and Maximum) are presented at the program level for two reasons:

1. Customer adoption rates and consideration of the Market Study performed by ODC are key to transforming Economic Potential into Achievable Potential.
2. Because stakeholders have typically reviewed results at the program level, presenting the achievable scenarios at the program level allow for better comparison and ease of comprehension.

Q. WHAT ARE THE RESULTS OF THE TECHNICAL AND ECONOMIC POTENTIAL ANALYSIS?

A. The results across the 15-year time frame of the Technical and Economic analysis are presented in Table 3 below in the form of average annual reduction in sales using 2021 sales as a baseline.

Table 3. Average Annual Reduction in Sales

Scenario		Residential	C&I	Total
Technical Potential	Savings (GWh)	198	259	458
	% 2021 Sales	2.37%	3.06%	2.72%
Economic Potential	Savings (GWh)	169	200	368
	% 2021 Sales	2.03%	2.35%	2.19%

Q. INTO WHAT PROGRAMS WERE THE MEASURES BUNDLED FOR THE ACHIEVABLE SCENARIOS?

A. The measures were bundled into seven residential and three non-residential program types, including:

Residential Programs

- **Appliance Recycling** – Promotes the retirement and recycling of inefficient, working refrigerators and freezers from households by offering incentives and free pick-up and responsible recycling of the equipment.
- **Heating, Cooling, and Water Heating** – Promotes investment in long-term savings by providing rebates for the purchase and installation of high-efficiency home HVAC equipment and heat pump water heaters.
- **Home Energy Check-up** – Conducts audits of all residential home types to educate on home energy consumption and identify opportunities to save energy and money. The program offers two tiers of service. Tier 1 includes the in-home consultation and free direct installation of LED bulbs and faucet aerators. In addition, water heater and water pipe wrap insulation are left with customers with electric water heaters as well. Tier 2 includes the Tier 1 services, as well incentives of up to 75% of the cost air-sealing, home insulation, and other building shell measures.
- **Home Energy Reports** – Provides (electronically or through mail) information on energy use to home occupants that encourages them to save energy. This information typically includes home energy use for the last month compared with historical energy use, and also compares the occupants' energy use with the energy use of similar homes. In the expanded case, the program switches from opt-in to an opt-out model.
- **Neighborhood Energy Efficiency** – Provides energy education, an on-site energy survey of the dwelling, and direct installation of select energy-saving measures at no additional cost for customers based on qualifying income levels. These are delivered in a door-to-door "sweep" approach in neighborhoods that have a significant number of households with low income, defined as $\leq 150\%$ of the federal poverty guidelines.
- **EnergyWise Savings Store (Online Store)** – Provides rebates for qualifying ENERGY STAR® lighting and smart thermostats through an online store, as well as education to increase customer awareness of energy-efficient appliances.
- **Multifamily** – Provides energy education, an on-site energy survey of the dwelling, and direct installation of select energy-saving measures specific to multifamily customers. In addition, energy efficiency measures are recommended for common areas to include

1 LED lamps and/or fixtures and will result in incentives for property
2 owners.

3 **Commercial and Industrial Programs**

- 4 • **EnergyWise for Your Business** – A prescriptive element of the
5 program provides incentives to customers per measure based on
6 deemed savings. A custom element identifies and implements site-
7 specific and unique cost-effective energy efficiency opportunities that
8 are not available via the prescriptive element based on calculated
9 savings for specific customer projects. Agricultural and strategic
10 energy management focused measures are added to the program to
11 meet the specific needs of commercial businesses.
- 12 • **Small Business Direct Install** – Implements energy efficiency
13 projects for customers whose usage is under 300 megawatt-hours
14 (“MWh”) annually and with no more than five accounts owned by a
15 single customer. These customers include convenience stores, offices,
16 garages, warehouses, restaurants, and other smaller businesses. The
17 program measures are directly installed for the customers and are
18 primarily lighting and refrigeration focused.
- 19 • **Municipal LED Lighting** – Provides incentives for municipal
20 customers to convert municipal street lighting from high-intensity
21 discharge to LED (solid state).

22 **Q. WHAT ARE THE DIFFERENCES AND UPDATES TO THESE**
23 **PROGRAMS AS COMPARED TO THE CURRENT PROGRAM**
24 **DESIGN AS PRESENTED IN THE MEDIUM CASE?**

25 A. Key Differences from Existing Programs to the Medium Case can be found
26 in Table 4 below.

1 **Table 4. Key Differences from Existing Programs to the Medium Case**

Program	Key Differences from Existing Programs to Medium Case
Appliance Recycling	Increased participation, increased implementation fees to reflect market prices, updated net to gross ("NTG") or free-ridership ratio
Heating, Cooling, and Water Heating	Increased participation for heat pump water heaters ("HPWH") and air source heat pump ("ASHP") measures, removed measures that were not cost-effective (e.g., AC rebates)
Home Energy Checkup – Tier 1	Increased participation and direct installation of non-lighting measures, phase out installation of direct install LEDs after 2027
Home Energy Checkup – Tier 2	Considered program component separately
Home Energy Report	Opt-out program, aligned savings based on EM&V recommendations
Multifamily	Increased participation, phases out installation of direct install screw-base LEDs after 2027
Neighborhood Energy Efficiency Program	Adjusted participation to achievable levels vs rapid assessment, increased implementation expenses to reflect market prices and increases cost of measures, phase out installation of direct install LEDs after 2027
Online Marketplace	Increased smart thermostats and other non-lighting measures, phased out sale of LEDs after mid-2023, implementation expenses increased to reflect market prices, cost of measures
Energy Wise for Your Business	Adjusted participation to achievable levels vs rapid assessment
Small Business Energy Solutions	Adjusted participation to achievable levels vs rapid assessment, implementation expenses and incentives increased to reflect market prices
Municipal LED Lighting	Phased out installation of LED streetlights after 2025

2 **Q. HOW WERE THE COSTS OF EACH PROGRAM DEVELOPED?**

3 A. Total program costs were estimated based on a combination of
 4 DESC's prior experience and the experience of other utilities implementing
 5 similar programs, adjusted as necessary to reflect the scale and other unique
 6 characteristics of DESC's programs. Program costs generally included the
 7 following:

- 8 • Administrative costs
- 9 • Implementation and delivery costs
- 10 • Quality Assurance/Quality Control costs
- 11 • Marketing costs
- 12 • IT costs

- Incentive processing costs
- Customer service costs
- Evaluation, Measurement, and Verification costs, and
- Other program costs.

The annual costs associated with each program are detailed in the Individual Program Descriptions section of Exhibit __ (AMD-1).

Q. HOW WAS PROGRAM PARTICIPATION FORECASTED?

A. Participation rates were developed using one or more of the following:

- Primary research in DESC's service area on customer market barriers and acceptance rates at different incentive levels;
- The Market Study performed by ODC which included home site visits and extensive surveying of customer attitudes and receptivity to participation in energy efficiency measures;
- ICF implementation experience;
- Historic participation in the program;
- Participation in similar programs offered by other utilities;
- The incentive strategy and level (percentage of incremental cost rebated) and resulting customer payback period;
- Turnover in the stock of baseline equipment;
- Level of new construction and/or major remodeling;
- Changes in future codes and standards;
- Trade ally feedback; and
- The level of marketing and promotion.

All participation forecasts included consideration of free-ridership (*i.e.*, program participants who would have taken the energy efficient action even in the absence of the program and who therefore provide no "net" benefit). For all measures and programs that are currently offered by DESC,

free-ridership was estimated based on actual DESC program impact evaluation results. Free-ridership for new measure types and programs was estimated by ICF based on program implementation experience.

Further details on these approaches are provided in Exhibit No. _____(AMD-1).

Q. HOW WAS PROGRAM COST-EFFECTIVENESS EVALUATED?

A. Program cost-effectiveness was evaluated using the program-level TRC test. The components of this test are summarized in Table 5.

Table 5. Program-Level TRC Test Components

Question Answered	Benefits	Costs
Will the net cost of all resources necessary to supply service across all utility services decrease? A benefit/cost ratio >1.0 indicates that net costs will decrease.	Net Electric Avoided Capacity Net Electric Avoided Energy Net Electric Avoided T&D Net Avoided Gas costs Net Customer O&M Savings	Measure Incremental Costs Program Operations (exc. Incentives) Cost Program Incentives Paid to "Free Riders"

Avoided capacity, energy, and transmission and distribution costs were valued in the same manner discussed above with respect to the measure-level TRC screening. Non-electric benefits included natural gas savings for measures such as insulation in gas-heated buildings. Avoided and deferred equipment replacement cost savings were included for measures that have a longer estimated useful life than the technologies they are replacing. All costs and benefits were adjusted, where appropriate, to reflect "net" participation (that is, the program only takes credit for those participants who took the

1 efficient action as a result of the program, and not for those who would have
2 taken the efficient action even in the absence of the program).

3 This is the same cost-effectiveness testing methodology previously
4 approved by this Commission.

5 **Q. WHAT ARE THE RESULTS OF THE COST-EFFECTIVENESS**
6 **ANALYSIS FOR ACHIEVEABLE SCENARIOS AT THE**
7 **PORTFOLIO LEVEL?**

8 A. The results of the analysis are summarized in Table 6.

9 **Table 6. Results of the Cost-effectiveness Analysis at the Portfolio Level**

Sector	Medium	Low	High
Residential	1.2	1.2	1.1
C&I	1.4	1.3	1.2
Total	1.3	1.2	1.1

10 **Q. WHAT ARE THE RESULTS OF THE COST-EFFECTIVENESS**
11 **ANALYSIS FOR THE RESIDENTIAL PORTFOLIO?**

12 A. The cost-effectiveness results for the Residential Portfolio are
13 provided in Table 7 below.

Table 7. Cost-effectiveness Results for the Residential Portfolio

Program	Medium	Low	High
Appliance Recycling	1.0	1.0	1.0
Heating, Cooling, and Water Heating	1.2	1.2	1.1
Home Energy Checkup - Tier 1	1.7	1.7	1.6
Home Energy Checkup - Tier 2	0.5	0.5	0.5
Home Energy Report	1.2	1.1	1.1
Multifamily	1.6	1.5	1.5
Neighborhood Energy Efficiency	1.1	1.0	1.0
Online Marketplace	2.5	2.4	2.3
Total (Residential Portfolio)	1.2	1.2	1.1

As can be seen in Table 7, all programs or program tiers are cost-effective across scenarios except for the Home Energy Checkup—Tier 2.

Q. WHAT ARE THE RESULTS OF THE COST-EFFECTIVENESS ANALYSIS FOR THE NON-RESIDENTIAL PORTFOLIO?

A. The cost-effectiveness results for the Non-Residential Portfolio are provided in Table 8 below.

Table 8. Cost-effectiveness Results for the Non-Residential Portfolio

Program	Medium	Low	High
Energy Wise for Your Business	1.3	1.3	1.2
Municipal Lighting	1.4	1.4	1.4
Small Business Energy Solutions	1.5	1.4	1.3
Total (C&I Portfolio)	1.4	1.3	1.2

As can be seen in Table 8, all Non-Residential programs are forecasted to be cost-effective across all achievable scenarios.

Q. WHAT WERE THE RESULTING ENERGY SAVINGS FROM THE ACHIEVEABLE SCENARIOS?

A. The annual incremental savings in 2024 as a percentage of 2021 sales is provided in Table 9 below.

Table 9. Annual Incremental Savings in 2024 as a Percentage Of 2021 Sales

	Medium Case	High Case	Low Case
Net Savings % of 2021 Sales (Excl Opt-Out)	0.39%	0.57%	0.35%
Gross Savings % of 2021 Sales (Excl Opt-Out)	0.51%	0.74%	0.46%

The savings were assessed at both the “net” (accounting for free-ridership) and “gross” (not accounting for free-ridership) at sales levels that include large customer opt-outs and levels that do not account for large customer opt-outs. Table 9 is provided only at the level that removes sales to the opt-out customers as this provides insight into what the maximum could be in terms of a percentage of sales. The highest resulting percentage reduction in sales (High Case, Gross Savings) is 0.74%.

Q. WERE THERE ADDITIONAL ACHIEVEABLE SCENARIOS ASSESSED?

A. Yes. As part of Commission order No. 2020-832, DESC was ordered to perform a full evaluation of the cost-effectiveness and achievability of DSM portfolios reaching annual energy sales reduction levels of 1%, 1.25%, 1.5%, 1.75%, and 2%.

1 **Q. DID THE ANALYSIS SHOW THESE SCENARIOS TO BE**
2 **ACHIEVABLE?**

3 A. No. ICF's bottom-up analysis created a DSM portfolio for DESC that
4 included all measures that were shown to be cost effective. It showed that the
5 achievable reduction in energy consumption on DESC system varied
6 between 0.74% and 0.46% based on reasonable and achievable rates of
7 customer participation as established from multiple sources. The 1%, 1.25%,
8 1.5%, 1.75%, and 2% incremental annual savings scenarios require higher
9 savings than the highest achievable levels for DESC's service territory and
10 therefore are above what could reasonably be achieved through DESC's
11 DSM programs. These programs would need to include measures and/or
12 programs that are not cost-effective and customer acceptance levels that are
13 not supportable. Given this, ICF determined that the additional scenarios are
14 not "achievable" but did take extra steps to model the cost-effectiveness of
15 these theoretical scenarios in order to comply with the order. However, even
16 where this theoretical analysis shows a program to be cost effective at a
17 higher level of savings, achieving that level of savings may not be possible
18 because it would require customer participation at levels that are not
19 supportable based on data from DESC's service territory.

Q. HOW WERE THE COSTS AND PARTICIPATION ESTIMATES PERFORMED FOR THE COMMISSION-REQUIRED SCENARIOS?

A. In order to develop cost-effectiveness estimates for the Commission-required scenarios, ICF relied heavily on benchmarking from other utilities for how costs would increase based on program expansion. Because the High Case showed none of these scenarios were achievable, ICF was not able to rely on primary DESC data. Additional details of the benchmarking efforts taken are provided in the Potential Study.

Q. WHAT ARE THE COST-EFFECTIVENESS RESULTS AT THE PORTFOLIO LEVEL FOR THE COMMISSION-REQUIRED SCENARIOS?

A. Table 10 provides summary level results of the cost-effectiveness at the various Commission-required scenarios.

Table 10. Summary Level Results of Cost-effectiveness at Commission-Required Levels

Sector	1.00%	1.25%	1.50%	1.75%	2.00%
Residential	0.9	0.8	0.8	0.8	0.7
C&I	1.0	0.9	0.9	0.8	0.8
Total	0.9	0.8	0.8	0.8	0.7

Q. WHAT ARE THE COST-EFFECTIVENESS RESULTS FOR THE PROGRAMS IN THE RESIDENTIAL PORTFOLIO FOR THE COMMISSION-REQUIRED SCENARIOS?

A. Table 11 provides summary level results of the cost-effectiveness for the residential programs at the various Commission Required scenarios.

Table 11. Cost-effectiveness Results for Residential at Commission-Required Levels

Program	1.00%	1.25%	1.50%	1.75%	2.00%
Appliance Recycling	1.0	0.9	0.8	0.7	0.6
Heating, Cooling, and Water Heating	0.9	0.9	0.9	0.9	0.9
Home Energy Checkup - Tier 1	1.7	1.2	0.9	0.7	0.5
Home Energy Checkup - Tier 2	0.4	0.4	0.4	0.4	0.4
Home Energy Report	2.6	2.2	1.8	1.5	1.1
Multifamily	1.9	1.6	1.4	1.2	0.9
Neighborhood Energy Efficiency	1.2	1.2	1.1	1.1	1.0
Online Marketplace	2.4	2.2	1.9	1.5	1.2
Total (Residential Portfolio)	0.9	0.8	0.8	0.8	0.7

Q. WHAT ARE THE COST-EFFECTIVENESS RESULTS FOR THE PROGRAMS IN THE NON-RESIDENTIAL PORTFOLIO FOR THE COMMISSION-REQUIRED SCENARIOS?

A. Table 12 provides summary level results of the cost-effectiveness for the non-residential programs at the various Commission Required scenarios.

Table 12. Cost-effectiveness Results for Non-Residential at Commission Required Levels

Program	1.00%	1.25%	1.50%	1.75%	2.00%
Energy Wise for Your Business	0.9	0.9	0.9	0.8	0.8
Municipal Lighting	1.4	1.4	1.4	1.4	1.4
Small Business Energy Solutions	1.0	0.9	0.9	0.8	0.8
Total (C&I Portfolio)	1.0	0.9	0.9	0.8	0.8

Q. WHAT ARE THE KEY FINDINGS OF THE 2023 DSM POTENTIAL STUDY?

A. Key findings from the 2023 DSM Potential Study are as follows:

1. In the Medium case, annual incremental savings in 2024 represent 0.51% of 2021 sales gross of free riders and these savings decrease slightly throughout the study period as the opportunity for energy

1 efficiency is reduced. Savings in the High case are about 44%
2 higher in 2024, representing 0.74% of 2021 sales.

3 2. The Commission-required scenarios represent a minimum 77%
4 increase above the High achievable potential case. These scenarios
5 also require participation that is beyond the maximum that can be
6 reasonably achieved through DESC's DSM programs.

7 3. The results of the Potential Study reflect the reality that a 1%
8 reduction in sales is not achievable. Any discussion of savings past
9 the High case is theoretical and would have to include non-cost
10 effective measures and participation values that are not achievable.

11 **Q. WERE WINTER DR PROGRAMS ANALYZED AS PART OF THE**
12 **POTENTIAL STUDY?**

13 **A.** Yes. ICF completed a comprehensive evaluation of DR programs for
14 both residential and commercial customers with an emphasis on decreasing
15 the winter peak. The final analysis was presented by sector in bundles where
16 the forecast included opt-in as compared to opt-out enrollment.

17 **Q. WHAT WAS THE HIGH-LEVEL PROCESS ICF TOOK FOR THE**
18 **DR ASSESSMENT?**

19 **A.** At a high level, the DR assessment consisted of three main steps:

20 1. Program Identification including development of a comprehensive
21 list of DR program types currently implemented in US markets.

1 2. Program Modeling using data such as implementation costs,
2 market sizes, and participation criteria. Primary DESC data, most
3 notably from the ODC market study, was relied upon when
4 available.

5 3. Program Assessment including producing peak reduction
6 estimation and cost-effectiveness information for three scenarios:
7 Reference, Low, and High.

8 **Q. WHAT WINTER DR PROGRAMS WERE ANALYZED AS PART OF**
9 **THE POTENTIAL STUDY?**

10 A. The DR programs assessed fall into three different types.

11 1. Dispatchable programs which are programs in which the utility
12 offers customers payments for installing DR-enabled devices and
13 reducing demand during specified periods when an event is called.

14 The reduction is usually done by a direct control of switches by
15 the utility or through a signal to the DR-enabled devices.

16 2. Hybrid Programs which are programs that usually are associated
17 with a tariff rider and rely on the price or incentive-based response
18 of the customers, but the response is expected only during the DR
19 events that are called by the utility.

20 3. Rate-based programs which are programs in which customers
21 voluntarily reduce their demand in response to energy price signals
22 or pre-informed pricing structures in which they enroll (“opt-in”

programs). In this study, all the programs were modeled as opt-in, except for the time of use (“ToU”) program which was modelled as both opt-in and opt-out.

The list of programs modeled can be found in Table 13 below.

Table 13. List of DR Programs Modeled

Program Type	Residential	Commercial and Industrial
Rates	Time of Use (Opt-in and Opt-out)	Time of Use (Opt-in and Opt-out)
	Demand Rates	Real Time Pricing
Hybrid	Peak Time Rebate	Interruptible
	Critical Peak Pricing	Critical Peak Pricing
Dispatchable	Backup Generation	Standby Generation (Backup Generation)
	Smart Thermostat	Smart Thermostat
	DLC - Water End-Uses	DLC - Water End-Uses
	DLC - Battery Storage	Auto Demand Response
	DLC - EV Smart Charger	

Q. WHAT WERE THE KEY FINDINGS OF THE DR ASSESSMENT?

A. Key findings from the DR assessment, for the scenario where all programs are rolled out as opt-in, are as follows:

- DR programs, including existing programs, have the potential to shave approximately 10% of the peak load, by 2037, in the reference case. This numbers goes up to 13% in the high case and can dip down to 9% in the low case. The corresponding MW

1 savings are 486 MW, 653 MW and 432 MW for the reference,
2 high and low cases.

3 2. Existing programs—interruptible and backup generation—
4 contribute to 47% of the total savings even in 2037. In 2037, 39%
5 of savings are achieved from the interruptible program and 8% of
6 savings are achieved from the backup generation program in the
7 reference case.

8 3. Among the new programs, smart thermostat, ToU and peak time
9 rebates are the highest contributors. In 2037, in the reference case,
10 these three programs contribute to 15%, 13% and 9% of the total
11 savings estimated from the DR programs.

12 4. Smart thermostats contribute 34% of the overall residential
13 savings, followed by 28% from the ToU residential program. In
14 the reference case, the contributions from the other programs (*i.e.*,
15 peak time rebate, critical peak pricing and demand rate stand at
16 19%, 12% and 7%, respectively).

17 5. Interruptible program contributes 72% of the total C&I savings,
18 followed by the backup generation program that contributes 15%.
19 All the other programs have single digit percentage contributions
20 adding up to 13%.

1 6. The portfolio level cost-effectiveness (*i.e.*, TRC) over a 15-year
2 period is 7.9. In all sectors, all programs except the real-time
3 pricing have TRC benefit-cost ratios greater than 1 in all cases.

4 **Q. IN YOUR PROFESSIONAL OPINION, DOES THE POTENTIAL**
5 **STUDY AS COMPLETED PROVIDE A FAIR AND ACCURATE**
6 **REPRESENTATION OF BOTH ACHIEVEABLE AND COST-**
7 **EFFECTIVE POTENTIAL FOR DSM PROGRAMS IN DESC'S**
8 **TERRITORY?**

9 A. Yes. The Potential Study performed is grounded in analytics and data
10 that is based on DESC's territory and includes the most up to date
11 information from both a market assessment and customers' willingness to
12 participate in DSM programs, as well evaluation results. Further, the process
13 of conducting the Potential Study allowed for a robust stakeholder
14 engagement process.

15 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

16 A. Yes, it does.